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seen. Delphinium may be considered the highest and latest developed type of the three, and *D. consolida* would seem to be of later origin than *D. tricome* and others. Aconitum may be a stage between Delphinium and Aquilegia.

The history of these different structures, the spur, the automatic filaments, etc., offers a very attractive field of investigation. The Ranunculaceæ, on account of their wide distribution, great numbers and variety of forms, seem especially favorable for studying this branch of vital dynamics.—*J. E. Todd, Tabor College, Iowa.*

BOTANICAL NOTES.—The process of fertilization of the tulip by Halictus bees is described in the *American Entomologist* for June, by W. H. Patton, who questions whether the nectar is poisonous, as stated in Miss Stavely's "British Insects."——The fertilization of *Cobæa penduliflora* of South America is effected, says A. Ernst, in *Nature*, by large Sphinx moths, and no flower gave a fruit without having its stigmata pollenized by crossing, self-fertilization being therefore excluded; he also confirms Bonnier's statement that the nectar is of no direct advantage to the plant. ——In this connection may be mentioned the excellent treatise of Mr. William Trelease on nectar, its nature, occurrence and uses, which appears in the report on cotton insects issued by the Agricultural Department, and which we notice in another place. ——Dr. H. Müller continues in *Kosmos* (IV, Heft 4, July, 1880) his series of papers on the relation of Alpine flowers to the theory of the production of flowers.——Dr. Eberth describes a Bacillus which he claims caused the death of a badger, the bacilli appearing to actively excite inflammation, the animal dying after a few days' illness, showing no other symptoms than decrease of appetite and weakness. The disease germs appeared in the liver, sections of the capillaries being crowded with them. ——Mr. W. T. T. Dyer contributes to Trimen's *Journal of Botany* an article on Lattakia tobacco, which owes its flavor to being smoked with the wood of an oak, *Quercus ruber* var.

ZOÖLOGY.[1]

A NEW HARVESTING ANT.—We have a true harvesting ant, it appears, at our very doors. In Vineland they are on every street, in every yard. At Island Heights, Ocean Grove, also, and Asbury Park, they are very numerous. A very large colony may be seen on the lawn opposite the Arlington House, at the former place. I have not looked for them farther north, but have no doubt they will be found generally in our latitude.

It is a small ant, the worker being about a line long. It is of a reddish-brown color. The head is rather large. The head of the soldier ant of this family is a marvel for size, being many times larger than the abdomen. It is not above working when necessary, but is not commonly seen on the surface. It appears to rule its community, and certainly furnishes the brains of the family, in bulk, at least. In battle it is a very Ajax. It is a ferocious, murderous warrior. A war between them is a terrible thing in a small way. They cut each other in two and yet continue to fight. I have on my table, now, a pair whose abdomens have been cut off just back of the posterior pair of legs, so that they run about without any apparent embarrassment. A few moments since I placed them near each other. They gave every sign of undiminished rage and courage and flew at each other as if in the best condition. And, as I write, one of these bodiless heads is actually walking off with the other. These unconquerable contestants were taken from formicaries about fifty feet apart. Under a good objective these heads exhibit the characteristic striæ of *Pogonomyrmex crudelis* Forel, as I am informed by Mrs. Treat, an excellent authority.

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[1] The departments of Ornithology and Mammalogy are conducted by Dr. ELLIOTT COUES, U. S. A.

The males and females are several times larger than the workers. I should think the female would outweigh forty of the little fellows. Though bothered with wings, the females are at this moment diligently excavating, in a small artificial formicary in which, as yet, I have placed no soldiers, but workers and females only. I have made many interesting notes concerning these strangers, which I may hereafter give to the public. I have sent specimens to Dr. Forel, who informs me that they belong to a variety of *Pheidole pennsylvanica.*

The rejected husks of seed carried out and piled up by their doorways first called my attention to them and revealed to me their character. It would seem that they do their house cleaning in the latter part of June, to be ready for harvesting the new crop of grass and other seed now ripening. Here and there, however, a careful eye may detect signs of some later work in husks just brought from below. Grass, clover, sorrel or other seed put near them will be seized and carried below with evident eagerness.

They have a violent antipathy to the little yellow ant—the pest of the pantry—a fact which may be used in recognizing them. Place a piece of cake full of the yellow ones near any formicary supposed to belong to the harvester and, if the supposition is correct, you will have the pleasure of seeing the big-headed soldiers rushing out with gaping mandibles eager to crush the tiny foe, and prevent the threatened invasion.—*Rev. G. K. Morris, Vineland, N. J.*

BUDDING IN FREE MEDUSÆ.—In a review of Packard's Zoölogy by J. W. F. in the August number of the NATURALIST, the following passage occurs: "On page 60 the author says, 'Budding occurs in the medusa of *Sarsia prolifera*, the only example known of budding in free medusæ.' Alex. Agassiz has shown that budding occurs in the free medusa of *Lizzia grata*, also in *Dysmorphosa fulgurans* and in *Hybocodon prolifer*. These medusæ are all found in New England waters. Many similar cases have been described in Mediterranean genera."

By an odd chance I had under the microscope, at the time I read this article, a medusa, a Willia, which must be added to this list, as it produces medusæ by budding from the base of the manubrium. During the latter part of July I took with the dipping net, in Beaufort Inlet, N. C., a great number of specimens of *Willia ornata* (McCr.) at various stages of growth; they agreed perfectly with Mr. Alex. Agassiz's description and figures, and show that the latter author was correct in referring two specimens to the same species as the single specimen found by McCrady at Charleston. With them was a single specimen of another form, which at first appeared to belong to a second species of Willia. Although it was larger than those of the common form in which the reproductive organs were fully developed, these were entirely wanting; there was a slight difference in the outline of the bell; the tentacles were only eight in number, short and thick, and usually carried coiled up under the edge of the bell. The tubes with the clusters of lasso cells, contained only a single cluster each, instead of two or three clusters, as in the ordinary form.

On the inner surface of the bell, where the radiating chymiferous tubes joined the manubrium, and therefore nearly in the position which is usually occupied by the four reproductive organs, four long branchial stolons hung down into the cavity of the bell, and the tip of each branch terminated in a medusa bud, with four rudimentary tentacles.

The general resemblance of this form to *W. ornata*, the occurrence of the two together, and the absence of reproductive organs, seems to indicate that we have, not a new species, but an asexual form of *W. ornata*, which gives rise to the sexual medusæ by budding, so that we have an alternation of generations of free medusæ.

The specimen soon died in confinement, and as stormy weather set in that night I got no more of them, hence the question whether the two forms belong to the same species must therefore be left in doubt for the present.—*W. K. Brooks, Beaufort, N. C.*

English Sparrows refusing to eat Worms.—One can hardly blame either bird or beast for not liking to eat caterpillars and canker-worms, but when it is claimed that that is what the English sparrow is for, it is well to keep the facts of the case before the people, as a great many persons are doing. I observed a "sin of omission" on their part here in Washington, which I do not remember to have seen in print. After every rain the common earth-worm comes out of the ground in great numbers, and upon the walks through the Smithsonian grounds, for example, where sparrows are abundant, they remain until they are dried to a crisp in the sun or crushed by the feet of pedestrians; and the sparrows are meantime rumaging the horse droppings in the street for, to them, more acceptable food. If they are really an insectivorous bird they surely ought not to refuse earth-worms, which are favorite food with such birds.—*C. A. White.*

HOW INSECTS RESIST COLD.—The cocoon surrounding an insect affords little protection, relatively, to temperature. Where a pupa resists congelation, it does so by virtue of a continuous and considerable liberation of heat. Whence is this production? According to Dr. Jousset de Bellesme *(Les Mondes)*, it is very probably due to the organic transformations taking place in the pupa. Without going so far as to say (with some naturalists), that all the organs are destroyed to be built upon another plan, it is certain (speaking only of the muscular system) that there is a disappearance of certain muscles that have served for the larvæ, and formation of new ones, to be used by the perfect insect. Such work could not be done without a reciprocal liberation and consumption of heat, which would compensate one another if the reconstructed muscles were the equivalent of those destroyed. But the muscular system of the larva is much more considerable than that of the perfect insect, hence all the heat rendered disposable by destruction of the old muscles is not utilized in construction of the new ones. Further, uric acid and its derivatives are found abundant in the insect which has been metamorphosed, and this is another proof of the existence of active combustions during the pupal period. It is then apparently, to these organized chemical phenomena that we must attribute the facility with which insects, in the course of transformation, bear very prolonged depressions of temperature.

"MIMICRY" IN SNAKES.—In the NATURALIST for September, the question is asked, "Does the fox-snake 'mimic' the rattlesnake?" This recalls an experience of mine that occurred several years ago, when collecting plants in the vicinity of Panola, Miss. A snake of an unknown kind running along in the low grass was pursued to some rails that lay in a loose pile on the ground where it had fled for safety. By means of a stick of sufficient length, after finding it, I held it fast to the side of a rail, when I was surprised and startled by a buzzing sound from its tail. The first thought was that I had a rattlesnake, but a glance at the tail and the color of the skin at once disproved this. Feeling safe from being bitten, the hold was kept, and the phenomenon observed. The tail, vertically flattened either naturally or for the occasion, was thrown into rapid vibrations from side to side. The snake was very angry at being held, and I thought this its mode of showing its spite. The sound seemed hardly as acute as that made by the rattlesnake, but may have been somewhat modified on account of the beating of the tail against a rail, as it did from its position. It was, however, a close enough imitation to cause one, on hearing it, to get out of the way of harm. My description of the way of producing the sound would be in almost exactly the same terms as those used by Mr. King, though, if I remember rightly, it was more continuous, still it was not without interruptions. On loosing my hold to get a better chance to kill the snake, being uninjured it glided rapidly away, and escaped among the grass and bushes, and, as I was not in search of that kind of specimens, no further pursuit was made. I did not know the species, but from its slender form, dark color, and rapid running, should think it a Coluber, or one nearly allied to that genus. Its length was about five feet.—*E. J. Hill, Englewood, Ill.*

NOTES ON THE MAMMALS OF SOUTHERN UTAH.—We have grizzly bears in small numbers in the mountains, although I have never been so fortunate (?) as to meet with one, but I have known of two being killed in the neighborhood of Ranch. I spent much of my time on the Pauns-a-gunt Plateau this summer, from June to November, and during the whole time I did not see any sign that indicated that bear of any kind were there or had been for a long time. The Indians say that they never find them there but that they are abundant on the Mar-ka-gunt Plateau. Black and cinnamon bears are reported, but they are very rare; I have never seen even a pelt of one that was killed in this locality. Of deer we have but one species, as far as I can learn, that is the mule deer. They frequent the high plateaus in the summer time when they kid in June and July; in October they come down upon the benches about the water courses where there are oaks, and remain until after the rainy season, when they go back upon the mountains, if the snows are not too deep; when this is the case they range on the sides of the mountains and at the foot of them on the broken hills. They are not as wary nor as fleet of foot as the fallow deer, as they will stand with head down evidently to hide their long ears in a bunch of brush, and allow the hunter to pass within a few steps of them without their running or, in fact, stirring. They seem to understand that their safety depends upon, what many of this world's folks have not learned to do, *i.e.*, keeping still. The Indians that hunt them at fawning time, tell me that they seldom find a doe with two young. They change their color in the fall of the year from a dirty clay color to a gray or ashen color with yellow legs; they have the power of erecting their hair when excited, and then are almost black. They are hard fighters; I have one, a pet doe, five months old, that whips any dog that comes about the place, using her fore legs as clubs to strike with, and when this is not efficacious jumping with all four feet upon her enemy; the last stroke always does the work. I got sight of two animals last August on Pauns-a-gunt Plateau; they were blue in color, with horns like a goat, five others were seen on the same plateau; I do not know what they are nor do I know anything about their habits. On the same plateau are panthers and wild cats, with porcupines and badgers. Everywhere can be found that hen-roost robber the coyote; it will eat fowls, rabbits, crows, crickets, grasshoppers and almost anything else of animal kind, including yellow jackets. Nests of small animals, white bellied or ground mice, gophers, kangaroo rats, mountain rats with their large pop eyes and flat tail, are abundant.—*A. L. Siler, Ranch P. O., Utah.*

ICHTHYDIUM OCELLATUM.—I have found this singular Infusorian, first described by E. Metschnikoff, from German waters, in great abundance in a land-locked salt pool near Mobjack bay, New Point Comfort, Va. It was associated with vast numbers of another member of the same family, viz: *Coleps hirtus* Ehbg. There were also great numbers of a small Amœba present, together with a species of Difflugia, which appears to be *Arcella vulgaris*, with which a large holotrichous Infusorian, which I did not determine, was often literally stuffed. The supposed eyes of *Ichthydium ocellatum* did not appear as distinct to me as they are figured by Metschnikoff. The chitinous annulate œsophagus and the singular backward prolongation of it, which it is hard to believe is a true intestine with a proper wall, was clearly seen. The zoölogical position of these symmetric Infusoria, as they were called by Dujardin (*Gasterotricha* Metsch. and Class, *Nematorhyncha* of Huxley), still apparently remains to be settled.—*J. A. Ryder.*

ON THE COURSE OF THE INTESTINE IN THE OYSTER (OSTREA VIRGINIANA).—In investigating the anatomy of the American oyster, under the auspices of the Maryland Fish Commission, at St. Jeromes creek, Md., I find an arrangement of the intestine so remarkable that I will briefly describe it. The mouth is a wide opening between the upper median angles of the palpi; so wide indeed, that the animal can scarcely be said to have an œsophagus; immediately follows the stomach, which is seen to have very pronounced folds internally, with a generally transverse direction, but two of these which lie in a somewhat ventral position, are a pair of inward projecting lobes which are themselves lobulated. The intestine then follows an oblique course, downwards and backwards, when it makes a sharp bend returning beneath the floor of the pericardial space, passing obliquely upwards and forwards, somewhat to the right and dorsad of the stomach, when it crosses exactly over the mouth or very short gullet, passing downwards to the left side of the animal, alongside and a little to the lower side of the stomach, when it again turns upwards and passes over the pericardial space to end in the rectum just over the middle of the adductor muscle. The liver, as is well known, dips into the folds of the walls of the stomach, but does not seem to follow the course of the intestine proper, which is provided internally with a curious pair of longitudinal and parallel folds, which project into the intestinal cavity and extend from the pyloric end to very near the anus. The presence of these folds, gives to the fœcal matters their singular appearance, which is not in the form of a cylinder as they leave the vent, but in the form of a tube with a part of one side removed. Tracing the course of the intestines by sections is not the proper way; they can be very easily dissected out for their entire length by means of the scissors and forceps.

The general likeness of this arrangement of the intestines to that of other Lamellibranchiates is apparent, but I was not prepared to find it return and cross over the mouth so very far forwards. Prof. Brooks[1] apparently believes the intestinal coils to lie behind the stomach and liver, which is not the case according to the foregoing observations, nor is the use of the words "coils" and "convoluted intestine" admissible, since there is but one complete turn of the canal upon itself.—*J. A. Ryder.*

PHOSPHORESCENCE OF VERY YOUNG FISHES.—Whilst investigating the development of *Cybium maculatum* and *Parephippus faber*, or the bay mackerel and porgy, under the auspices of the United States Fish Commission, in Mobjack bay, Virginia, I found that the latter species, when three days old, was very decidedly phosphorescent at night when sudden impulses were imparted to the sea water in which they were swimming about, acting in this regard in relation to such sudden vibratory impulses the same as numerous species of marine animals, such as some worms, Medusæ, Polyps, Infusoria and many larval forms of Crustacea and other marine types which swim at the surface of the water at night. The presence of an extraordinary development of amœba-form cells over certain parts of the bodies of these little fishes, may be the cause of these phenomena. So striking is the resemblance of these migratory superficial amœba-like cells to some of the *Protoplasta*, that were it not that they lack a contractile vesicle they might readily be regarded as their homomorphs.

These cells, moreover, change their forms from time to time very considerably, but tend to aggregate in anastomosing clusters, a sort of syncytium over the oil-globule in the umbilical vesicle; over the ectoderm of the vesicle itself and on certain portions of the body and tail. They are very different from pigment corpuscles, which are also present.

Besides these cells a peculiar homogenously distributed reddish tinge is acquired by the membranes of the umbilical vesicles of the porgy on the third day, which is not due to the presence of blood globules.

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[1] Development of the American Oyster (Biological Studies from the Laboratory of Johns Hopkins University, No. IV), pp. 9–10.

To whichever of these structural causes, the phenomenon of organic phosphorescence is attributable in this special case, there seems to me to be little doubt that the prime element in the production of phosphorescence in the animal world in general, is some kind of sudden molecular disturbance or impulse, disturbing the equilibrium of the molecules of the living protoplasm involved, so as to produce a kind of motion which makes itself apparent as momentary emissions of light. I have no doubt that the phenomenon in Lampyris or the fire-fly, is connected with expiration and inspiration, and possibly in the Medusæ with the rhythmical contraction of the umbrella. The application of experimental methods to verify the above suggestions would be very easy.—*J. A. Ryder.*

ZOOLOGICAL NOTES.—Mr. M. M. Hartog shows that the larvæ or zoëæ of cancer have, like the adult entomostraca, an anal respiration, the terminal part of the rectum being slightly dilated, and with a rhythmic contraction and expansion associated with the opening and closing of the vent.——Hybrids between males of Reeves's pheasant and hens of the common pheasant were exhibited at a recent meeting of the Zoölogical Society of London.——A honey ant with an immensely distended abdomen, like Myrmecocystus, has been discovered in Australia.——Reinfleisch claims to have demonstrated the origin of the red corpuscles of mammals; *i. e.*, the nucleus of the red-colored cell escapes and atrophies, while the body of the cell contracts and becomes the red corpuscle——The influence of light on animals has been studied, according to the Journal of the Royal Microscopical Society, by Moleschott and Fubini. It increases the excretion of carbonic acid and the ingestion of oxygen; but this influence is not only effected through the eyes, but by the skin, for it is seen in eyeless animals.——Weismann has found that several ostracode Crustacea, especially Cypris, reproduce parthenogenetically.——At the meeting of the Linnæan Society of London, held June 17, Sir John Lubbock presented additional observations on the habits of ants, especially concerning their powers of communicating their ideas to each other; he confirms the prevalent notion that ants possess "something approaching language."

ANTHROPOLOGY.[1]

MAYA CHRONOLOGY.—The Proceedings of the American Antiquarian Society, No. 74, contains a paper by Mr. Philipp J. J. Valentini, on the Katunes of Maya history. The Katunes were a series of notable events that transpired from the time of the

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[1] Edited by Prof. OTIS T. MASON, Columbian College, Washington, D. C.